



Department of Commerce

Safety & Buildings Division

201 West Washington Avenue

P.O. Box 2658

Madison, WI 53701-2658

Evaluation # 200269-H (Replaces 950040-H)

Wisconsin Building Products Evaluation

Material

Multi-Oil Boilers, Unit Heaters and
Central Furnaces and
Multi-Oil Fired Atomizing Type Burners

Manufacturer

Firelake Mfg., LLC
961 N. First Street
Dassel, MN 55325

SCOPE OF EVALUATION

GENERAL: This report evaluates Shenandoah Models L(24, 60)W, and L(24, 60)S combustion-type waste oil burning boilers, Shenandoah Models WO-F(95D, 125, 145, 175, 235, 350, 500) and Horizon (200, 315) combustion-type waste oil burning unit heaters, Shenandoah Models WO-F(175D, 235D, 350D, 500D) combustion-type waste oil burning central furnaces, and Shenandoah Models B(5, 10) waste oil-fired burners (air atomizing type). The waste oil burning equipment is manufactured by Firelake Manufacturing, LLC.

This review includes the cited **International Building Code (IBC)** requirements below in accordance with the current **Wisconsin Amended IBC Code:** The Shenandoah Models: L(24, 60)W, and L(24, 60)S combustion-type waste oil burning boilers, WO-F(95D, 125, 145, 175, 235, 350, 500) and Horizon (200, 315) combustion-type waste oil burning unit heaters, WO-F(175D, 235D, 350D, 500D) combustion-type waste oil burning central furnaces, and Shenandoah Models B(5, 10) waste oil-fired burners (air atomizing type), were evaluated for use as waste oil burning appliances in accordance with **s. IBC 302.1.1.1**.

This review includes the cited **International Mechanical Code (IMC)** requirements below in accordance with the current **Wisconsin Amended IBC Code:** The Shenandoah Models: L(24, 60)W, and L(24, 60)S combustion-type waste oil burning boilers, WO-F(95D, 125, 145, 175, 235, 350, 500) and Horizon (200, 315) combustion-type waste oil burning unit heaters, WO-F(175D, 235D, 350D, 500D) combustion-type waste oil burning central furnaces, and Shenandoah Models B(5, 10) waste oil-fired burners (air atomizing type), were evaluated for use as waste oil burning appliances in accordance with **ss. Comm 64.0001, 64.0002, 64.0102, 301.3, 301.4(a), 301.5, 303.1, 304.1, 910.1, 917.1, and 918.1**.

The Shenandoah Models: L(24, 60)W, and L(24, 60)S combustion-type waste oil burning boilers, WO-F(95D, 125, 145, 175, 235, 350, 500) and Horizon (200, 315) combustion-type waste oil burning unit heaters, WO-F(175D, 235D, 350D, 500D) combustion-type waste oil burning central furnaces, and Shenandoah Models B(5, 10) waste oil-fired burners (air atomizing type), were evaluated for use as waste oil burning appliances in accordance with the current **Wisconsin Flammable and Combustible Liquids Code, Chapter Comm 10**.

SBD-5863 (R. 10/00)

DESCRIPTION AND USE

Warm Air Furnace Models WO-F(175D, 235D, 350D, 500D): The Shenandoah furnace Models WO-F are indirect fired, forced warm air circulating central heating furnaces with fan and limit controls, with adjustable air louvers, or they can be warm air ducted. They come with a multi-oil fired, automatically ignited gun type burner with intermittent proved ignition, mechanical draft fan, electric fuel pre-heater, fuel and air solenoid valves, fuel and air regulators with gauges, fuel pumps, ignition transformers, 45-second primary safety controls and air atomizing nozzles. The furnaces and burners are for use with No. 1 and No. 2 fuel oils, used crankcase oil up to S.A.E. 50-weight and used automatic transmission fluid.

Model number WO-F175D, WO-F235D, WO-F350D and WO-F500D; the letter "D" when added to the model number designates ductible models.

The Shenandoah Model WO-F125 is a factory-built fabricated steel horizontally suspended furnace with overall casing dimensions of 28 inches (in.) long (L.) by 20 in. wide (W.) by 33 in. high (H.), less burner and blower.

Models	BTUH INPUT W/NO. 2 FUEL	MAX. G.P.H.	MIN. AIR REQUIRED
WO-F125	130,000	0.90	2.0 CFM @ 40 PSI
WO-F175 WO-F175D	175,000	1.25	
WO-F235 WO-F235D	235,000	1.68	
WO-F350 WO-F350D	350,000	2.50	
WO-F500 WO-F500D	500,000	3.50	

Notes:

1. For use with gun type burner: WO-B5 only.
2. Waste oil furnaces are dependent on proper draft condition for efficient burning. Negative draft requirement: -.04 to -.06 inches of water column.
3. Maximum distance for horizontal connector pipe to run to chimney is 8 feet with a 1/4-inch rise per foot.
4. Plenum and duct clearances are 6 inches for first 6 feet and 2 inches thereafter.
5. When suspended, use (4) 5/8-11 threaded rods.
6. Units may be installed on a noncombustible surface or may be mounted on platform using 8-inch high concrete blocks beneath furnace when ducted.

Minimum Clearances Between Furnace and Combustibles

Above 18 inches
Below 18 inches
Rear 30 inches
Front 36 inches

Inlet Blower 18 inches
Outlet Louver 84 inches
Chimney Connector 18 inches

Multi-Oil Fired Forced Hot Water Boilers: The Shenandoah Models L(24, 60)W, and L(24, 60)S boilers (available with or without domestic coils), are ASME code stamped, factory-built, indirect fired, low pressure steam and low pressure hot water circulating, central heating or tank-less water heating boiler assemblies, with water legs, sloped horizontal water tubes, optional tank-less domestic hot water coils, listed steam or hot water trim, 10-inch diameter rear flue outlet, and with an air atomizing multi-oil fired gun type burner. The Shenandoah burner Models WO-B5 and WO-B10 are for firing up to 6 GPH on No. 1 and 2 fuel oil, used crankcase oil up to S.A.E. 50-weight and used automatic transmission fluids.

The Models L(24, 60)W, and L(24, 60)S (available with or without domestic coils) multi-oil fired hot water or steam boilers are the same configuration except for the controls or boiler trim package. All clearances are oriented with the oil burner as the front.

MODELS	BTUH INPUT W/NO. 2 FUEL	BURNER MODEL	MAX GPH	MIN AIR REQUIRED
WO-BC235/60	235,000	WO-B5	1.68	2.0 CFM
WO-BC350/60	350,000	WO-B5	2.5	@ 40 PSI
WO-BC500/60	500,000	WO-B10	3.5	5.0 CFM
WO-BC650/60	650,000	WO-B10	4.6	@
WO-BC800/60	800,000	WO-B10	5.7	40 PSI
WO-WHC500	500,000	WO-B5	4.6	2.0 CFM @ 40 PSI
WO-WHC800	800,000	WO-B10	5.7	5.0 CFM @ 40 PSI

Minimum Clearances Between Furnace and Combustibles

Above 18 inches
Rear 18 inches
Front 48 inches

Sides 18 inches
Chimney connector 18 inches

TEST RESULTS

Models WO-F95D, -F125, -F125D, -F175, -F175D, -F235, -F235D, -F350, -F350D, -F500, -F500D and Horizon (200, 315), all for use with the WO-B5 air atomizing gun type burner, successfully passed the applicable requirements for the examination and safety testing using the following standards:

- ETLM 83-1, Section 5, “Requirements for Safety Testing of Multi-Oil Fired Appliances”;
- UL 296, Section 4 “Standard for Oil Burners”;
- UL 727, “Standard for Oil Fired Central Furnaces”; and
- UL 296A, “Waste Oil Burning Air Heating Appliances.”

Models WO-BC (235/60, 350/60, 500/60, 650/60, 800/60), WO-WHC (500 and 800), for use with the WO-B5 and WO-B10 air atomizing gun type burners, successfully passed the applicable requirements for the examination and safety testing using the following standards: UL 296, Section 4, UL 726, Section 4 “Oil Fired Boiler Assemblies” and ETLM 83.1., Section 5.

Also considered for the above models were applicable sections from NFPA Codes and Standards, including:

- NFPA No. 31, “Installation of Oil Burning Equipment”;
- NFPA No. 211, “Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances”; and
- NFPA No. 70, “National Electric Code.”

A Listing, Marking and Follow-Up Agreement was executed between Manufacturing Company, Inc., and the Energy Testing Laboratory of Maine (ETLM/SMVTI) for periodic inspections at the Shenandoah Manufacturing Company, Inc., manufacturing facilities. Listed appliances are permanently labeled.

LIMITATIONS OF APPROVAL

Because garages and aircraft hanger buildings are classified as a high hazard use under **IBC Chapter 3**, waste oil tanks are not required to be placed in rated enclosures within those occupancies.

The Shenandoah Models waste oil equipment are approved as a heating appliance that meet standards recognized by the department and are listed by an agency recognized by the department in accordance with **(IMC) as Modified by Chapter Comm 64**.

The Shenandoah Models waste oil equipment installed in a storage garage, repair garage and factory occupancies shall be installed as required per **s. IBC 302, Table 302.1.1**, and **s. IBC 1007.1**.

The waste oil central furnaces and unit heaters shall be installed in garages suspended at least 8 feet off the main floor and be visible from the main floor in accordance with **s. IBC 406.6.5, Exception 1**.

The waste oil central furnaces and unit heaters shall be installed in aircraft hangers as allowed in **s. IBC 412.2.4.**

In occupancies where waste oil equipment is allowed, the equipment protection from damage shall be in accordance with **s. IMC 303.4**

Class II fuel oil tanks (No. 2 fuel oil or other combustible fuels) and used crankcase oil tanks shall comply with **Chapter Comm 10** in accordance with **(IMC) as Modified by Chapter Comm 64.**

The tank shall be installed indoors in accordance with **s. Comm 10.335 (2)**, no more than 36 inches above the floor. The tank shall be provided with a 2-inch I.D. normal vent and with a 4-inch I.D. emergency vent. Both vents shall terminate outside the building in accordance with NFPA 30.

The fill opening for the tank may terminate outside the building in accordance with section 2-4 of NFPA 30 or inside the building in accordance with section 5-4 of NFPA 30. If the fill terminates inside the building, it must be closed with a vapor tight cap or be part of a closed system. The fill pipe shall be closed after the filling activity is completed.

As is required for all types of heating equipment and fuel tanks, plans shall be submitted to the department for review in accordance with **s. Comm 61.30.**

The waste oil central furnaces and unit heaters shall be installed, vented, and used in accordance with their listing, the manufacturer's recommendations and this evaluation.

The WO-F models listed herein, are not for residential use; commercial and industrial applications only. The WO-BC and WO-WHC models listed herein are for use in commercial and industrial heating and hot water process applications only, for installation on a noncombustible floor and they are not for out-of-door use.

The boilers and hot water heaters are to be vented, using a 10-inch diameter 24-gauge steel chimney connector pipe, to a listed factory-built chimney, steel smoke stack or a tile-lined masonry chimney, installed or built in accordance with NFPA Standard No. 211.

These boilers and burner assemblies come with listed primary safety controls and listed combustion safeguards.

The furnaces, boilers, water heaters and burners shall be installed in accordance with their listing and the manufacturer's recommendations.

Fuel oil and crankcase oil tanks serving the equipment shall be installed in accordance with **Chapter Comm 10, Wisconsin Flammable and Combustible Liquids Code.**

This approval will be valid through December 31, 2007, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: March 12, 2003

By: _____

Lee E. Finley, Jr.
Product & Material Review
Integrated Services Bureau